

REMARKS

Claims 26, 39, 52, 54, 55 and 62 have been amended for clarification purposes only without any intention of narrowing the scope of any of the claims. Entry of this Amendment is proper under 37 C.F.R. §1.116 as the amendments: (a) place the application in condition for allowance for the reasons discussed herein; (b) do not present any new issues that would require further consideration and/or search as the amendments merely amplify issues discussed throughout the prosecution; (c) do not present any additional claims without canceling a corresponding number of claims; and (d) place the application in better form for appeal, should an appeal be necessary. Entry of this Amendment is thus respectfully requested. Reconsideration and allowance based on the following remarks are respectfully requested.

Applicant expresses appreciation for the courtesies extended by Examiner Kim to Applicant's representatives, Jean-Paul Hoffman and Jaclyn Schade, during the telephone interview conducted on January 24, 2008 (hereinafter the "Interview"). The substance of the Interview is incorporated into the remarks below and constitutes Applicant's record of the Interview as well as the response to the Interview Summary dated February 11, 2008.

Applicant submits that it is unfair and improper to make this Office Action final as Applicant has not been provided a proper opportunity to respond to the rejection based on Japanese Patent Application Publication No. JP 11-354409 to Shiozawa (hereinafter "Shiozawa"). First, the translation of Shiozawa supplied with the Office Action is not a proper translation. The computer prepared translation of Shiozawa is practically unintelligible. Further, even assuming that the computer translation of Shiozawa were proper, Applicant is only getting an opportunity to review and properly respond to the rejection based on Shiozawa for the first time on this final Office Action. Applicant submits that this is not only unfair but improper. Accordingly, Applicant reserves the right to have the finality of this Office Action reviewed. However, merely to expedite prosecution of this matter, Applicant has responded to the merits of the rejection and kindly requests full consideration of the amendments and arguments made herein.

### **REJECTIONS UNDER 35 U.S.C. §112**

Claims 26-49 and 52-55 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement, and under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicant respectfully traverses the rejections.

Merely to expedite prosecution, claims 26, 52, 54, and 55 have been amended to specify that the claimed measuring is performed out of the path of the beam of radiation. Applicant respectfully submits that was already clear in un-amended claims 26, 52, 54, and 55, and now is undoubtedly clear. The amendments are supported by the specification of the present patent application. *See, e.g.*, original specification at paragraphs [0063] and [0106] and FIG. 9.

Thus, Applicant respectfully requests that the 35 U.S.C. §112 rejections be withdrawn.

### **REJECTIONS UNDER 35 U.S.C. §103**

Claims 26-34, 36, 39, 41, 43, 44, 47, 48, and 52-55 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,545,746 to Nishi (hereinafter “Nishi ‘746”) in view of U.S. Patent Application Publication No. 2003/0025890 to Nishinaga (hereinafter “Nishinaga”). Applicant respectfully traverses this rejection.

Applicant submits that the cited portions of Nishi ‘746 and Nishinaga fail to disclose or teach a lithographic projection apparatus comprising, *inter alia*, a radiation-energy detector configured to determine the energy of the beam of radiation, the beam of radiation passing at least partly through a region of interactive gas, the detector comprising a sensor, the sensor, in operation, providing an output signal that is proportional to an amount of interaction of the beam of radiation with the region of gas, and measuring, out of a path of the beam of radiation, the amount of interaction of the beam of radiation with the region of gas, as recited in claim 26.

As noted in the Applicant’s previous responses, which are hereby incorporated by reference in their entirety, the cited portions of Nishi ‘746 make no mention or suggestion of a radiation-energy detector as recited in claim 26. Furthermore, as acknowledged in the Office Action, Nishi ‘746 does not disclose a radiation-energy detector as recited in claim 26. *See* Office Action at page 5. Nishinaga is provided as allegedly disclosing a radiation-energy detector as recited in the claims. However, Applicant respectfully disagrees.

The cited portions of Nishinaga disclose an uneven illuminance sensor 42 and a scanning plate 43 installed in the vicinity of a wafer holder 38 on a wafer stage 39. Uneven illuminance sensor 42 is used as an exposure amount-distribution measuring unit. A plurality of points are detected in the scanning direction to determine the illuminance distribution on the wafer stage 39. The scanning plate 43 is used with a number of elements to form a spatial image-measuring system 46. *See, e.g.*, paragraph [0125] and FIGs. 1 and 4A of Nishinaga.

However, claim 26 recites a radiation-energy detector that measures, out of a path of the beam of radiation, the amount of interaction of the beam of radiation with the region of gas. Nowhere in the cited portions of Nishinaga is there provided such a radiation-energy detector. Nishinaga uses sensor 42 and scanning plate 43 in the path of the beam of radiation to determine uneven distribution of light. Further, the cited portions of Nishinaga fail to disclose a region of interactive gas as recited in the claim. Thus, the sensor 42 and scanning plate 43 of Nishinaga do not measure the amount of interaction of a beam of radiation with a region of interactive gas as recited.

Additionally, Applicant respectfully submits that there is no proper reasoned basis, based on evidence of record, to combine the sensor 42 and scanning plate 43 of Nishinaga with the system 30 of Nishi. For example, the sensor 42 and scanning plate 43 of Nishinaga are mounted on a wafer stage 39 to detect a light beam directly impinging on the sensor 42 and scanning plate 43. *See, e.g.*, Nishinaga at FIG. 1. The light detecting system 30 of Nishi, however, is mounted on an upper end portion of a projection optical system PL to detect reflected light from the wafer. *See, e.g.*, Nishi at column 17, lines 32-42 and FIG. 1. One would not be motivated to use the sensor 42 mounted on the stage 39 of Nishinaga in the system of Nishi to determine reflected light because the sensor 42 of Nishinaga is configured to receive light directly. Additionally, one would not be motivated to use the sensor 42 mounted on the stage 39 of Nishinaga in the system of Nishi because the sensor 42 of Nishinaga is configured to be mounted on the wafer stage, not on the projection system.

The Office Action further states that in Nishi a detector is required to control the amount of light, and that the cited portions of Nishi disclose detecting the amount of light reflected from a substrate, thus making it obvious to provide the detector of Nishinaga to the system of Nishi. *See* Office Action at page 14. A closer reading of the cited portions of Nishi, however, disclose that light detecting system 30 detects a light beam reflected from the wafer W merely to determine the reflectivity of the wafer surface, illuminance nonuniformity, and measurement of a spatial image. *See* Nishi at column 17, lines 32-42. There is no indication in the cited portion of Nishi that its detector is used to control the amount of light. Further,

there is, for example, no indication in the cited portions of Nishi that its detector provides an output signal that is proportional to an amount of interaction of a beam of radiation with a region of interactive gas or that it measures such interaction out of the path of the beam of radiation. Thus, Applicant submits that the cited portions of Nishi are not properly combinable with the cited portions of Nishinaga for the reasons asserted in the Office Action for proper combination.

Even if the cited portions of Nishi and Nishinaga were properly combinable, which Applicant does not concede, the combination would fail to disclose or suggest a radiation detector as recited in the claims. At most, a proper combination of the cited portions of Nishi and Nishinaga would provide the ability to determine illuminance nonuniformity and/or distribution of a light beam with respect to a wafer, *not* a determination regarding the amount of interaction of the beam of radiation with a region of interactive gas or to do so out of the path of the beam of radiation.

Therefore, Applicant respectfully submits that the cited portions of Nishi ‘746, Nishinaga, and any proper combination thereof fail to disclose, teach, or suggest each and every element recited by claim 26. Claims 52, 54, and 55 are patentable over the cited portions of Nishi ‘746 and Nishinaga for at least similar reasons as provided above for claim 26, and for the features recited therein. Claims 27-34, 36, 39, 41, 43, 44, 47, 48, and 53 respectfully depend from claims 26 and 52 and are, therefore, patentable for at least the same reasons provided above related to claims 26 and 52, and for the additional features recited therein. Thus, Applicant respectfully requests that the rejection of claims 26-34, 36, 39, 41, 43, 44, 47, 48, and 52-55 under 35 U.S.C. §103(a) in view of Nishi ‘746 and Nishinaga should be withdrawn and the claims be allowed.

Claims 26, 27, 30, 52, 54 and 55 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Application Publication 2001/0030740 A1 to Mori et al. (hereinafter “Mori”) in view of Nishinaga. The rejection is respectfully traversed.

Applicant submits that the cited portions of Mori and Nishinaga fail to disclose a lithographic projection apparatus comprising, *inter alia*, a radiation-energy detector configured to determine the energy of the beam of radiation, the beam of radiation passing at least partly through a region of interactive gas, the detector comprising a sensor, the sensor, in operation, providing an output signal that is proportional to an amount of interaction of the beam of radiation with the region of gas and measuring, out of a path of the beam of

radiation, the amount of interaction of the beam of radiation with the region of gas, as recited in claim 26.

For example, the cited light detector 24 of Mori measures the intensity of light, passing through the projection lens, in a path of the light beam. *See, e.g.*, Mori at FIG. 1 and paragraph [0058]. However, the cited portions of Mori do not disclose that the detector 24 measures, out of a path of the beam of radiation, the amount of interaction of the beam of radiation with a region of interactive gas. Nishinaga is provided as allegedly disclosing this feature.

Even if the cited portions of Mori and Nishinaga were to be properly combinable, which Applicant does not concede, the cited portions of Nishinaga fail to disclose, as noted above, a radiation-energy detector and a region of interactive gas as recited in claim 26. The sensor 42 of Nishinaga does not measure, out of a path, the amount of interaction of a beam of radiation with a region of interactive gas as recited.

At most, a proper combination of the references would merely provide a detector for detecting the intensity of light passing through the projection lens (as noted in Mori) and detecting the illuminance distribution in relation to a wafer table (as noted in Nishinaga). Their combination would not, however, disclose a radiation-energy detector comprising a sensor, in operation, providing an output signal that is proportional to an amount of interaction of the beam of radiation with a region of interactive gas and measuring, out of a path of the beam of radiation, the amount of interaction of the beam of radiation with the region of gas, as recited in claim 26.

Therefore, Applicant respectfully submits that the cited portions of Mori, Nishinaga, and any proper combination thereof fail to disclose each and every element recited by claim 26. Claims 52, 54, and 55 are patentable over the cited portions of Mori and Nishinaga for at least similar reasons as provided above for claim 26, and for the features recited therein. Claims 27 and 30 respectfully depend from claim 26 and are, therefore, patentable for at least the same reasons provided above related to claim 26, and for the additional features recited therein. Thus, Applicant respectfully requests that the rejection of claims 26, 27, 30, 52, 54 and 55 under 35 U.S.C. §103(a) over Mori and Nishinaga should be withdrawn and the claims be allowed.

Claims 26-34, 36-39, 41, 43, 44, 47, 48, and 52-55 were rejected under 35 U.S.C. §103(a) as being unpatentable over Japanese Patent Application Publication No. JP 11-

354409 to Shiozawa (hereinafter "Shiozawa") in view of Nishinaga. The rejection is respectfully traversed.

Applicant respectfully submits that the cited portions of Shiozawa fail to disclose or teach a lithographic projection apparatus comprising, *inter alia*, a radiation-energy detector configured to determine the energy of the beam of radiation, the beam of radiation passing at least partly through a region of interactive gas, the detector comprising a sensor, the sensor, in operation, providing an output signal that is proportional to an amount of interaction of the beam of radiation with the region of gas and measuring, out of a path of the beam of radiation, the amount of interaction of the beam of radiation with the region of gas as recited in claim 26.

The cited portions of Shiozawa disclose an illuminator in which the oxygen concentration or wavelength of a source is changed to obtain a uniform illuminance distribution on a wafer. (*See* Abstract of Shiozawa). The Office Action refers to element 16 in Shiozawa, which appears to be a sensor. However, as affirmed at page 8 of the Office Action, Applicant respectfully submits that Shiozawa does not disclose or teach a sensor, in operation, providing an output signal that is proportional to an amount of interaction of the beam of radiation with the region of gas and measuring, out of a path of the beam of radiation, the amount of interaction of the beam of radiation with the region of gas as recited in claim 26. Rather, for example, Shiozawa appears to disclose and teach the opposite since, in order for element 16 of Shiozawa to measure the light, the sensor 16 of Shiozawa must be in the path of the beam of light. Nishinaga is provided as disclosing such a feature.

Even if the cited portions of Shiozawa and Nishinaga were to be properly combinable, which Applicant does not concede, the cited portions of Nishinaga fail to disclose, as noted above, a radiation-energy detector and a region of interactive gas as recited in claim 26. Thus, the sensor 42 of Nishinaga could not measure, out of a path of a beam of radiation, the amount of interaction of the beam of radiation with a region of interactive gas as recited.

At most, any proper combination of the cited portions of Shiozawa and Nishinaga would merely provide a detector for detecting the illuminance distribution and light exposure in relation to a wafer or substrate table. *See, e.g.*, Shiozawa at paragraphs [0053], [0057], and FIG. 1 and Nishinaga at paragraph [0125] and FIG. 1. Their combination would not, however, disclose a radiation-energy detector and a sensor, in operation, providing an output signal that is proportional to an amount of interaction of the beam of radiation with a region of interactive gas and measuring, out of a path of the beam of radiation, the amount of interaction of the beam of radiation with the region of gas, as recited in claim 26.

Claims 52, 54, and 55 are patentable over the cited portions of Shiozawa and Nishinaga for at least similar reasons as provided above for claim 26, and for the features recited therein. Claims 27-34, 36-39, 41, 43, 44, 47, 48 and 53 depend from claims 26 and 52 respectively and are, therefore, patentable for at least the same reasons provided above related to claims 26 and 52 respectively, and for the additional features recited therein. Thus, Applicant respectfully requests that the rejection of claims 26-34, 36-39, 41, 43, 44, 47, 48, and 52-55 under 35 U.S.C. §103(a) over Shiozawa in view of Nishinaga should be withdrawn and the claims be allowed.

Claim 35 was rejected under 35 U.S.C. 103(a) as being unpatentable over Nishi in view of Nishinaga as applied to claim 26 and further in view of U.S. Patent Application Publication No. 2003/0020888 to Tanaka et al. (hereinafter “Tanaka”). Applicant respectfully traverses this rejection.

Claim 35 depends from claim 26. As discussed above, the cited portions of Nishi ‘746 and Nishinaga fail to disclose or render obvious each and every element of claim 26.

Even assuming *arguendo* that the cited portions of Nishi ‘746, Nishinaga, and Tanaka are properly combinable (which Applicant does not concede), Applicant submits the cited portions of Tanaka fail to overcome the shortcomings of Nishi ‘746 and Nishinaga. For example, the cited portions of Tanaka merely disclose providing pressure sensors for sensing pressure within the spaces between the optical elements and adjusting the optical performance of the optical system based on the pressures detected by the pressure sensor. (See, e.g., paragraph [0020] of Tanaka). The cited portions of Tanaka make no mention or suggestion of a sensor, in operation, providing an output signal that is proportional to an amount of interaction of the beam of radiation with the region of gas and measuring, out of a path of the beam of radiation, the amount of interaction of the beam of radiation with the region of gas, as recited in claim 26.

Therefore, Applicant respectfully submits that a *prima facie* case of obviousness has not been established and that the cited portions of Nishi ‘746, Nishinaga, Tanaka, or a proper combination thereof, fail to disclose or render obvious each and every element recited by claim 26. Claim 35 depends from claim 26 and is, therefore, patentable for at least the same reasons provided above related to claim 26, and for the additional features recited therein. Thus, Applicant respectfully requests that the rejection of claim 35 under 35 U.S.C. §103(a) over Nishi ‘746 and Nishinaga in view of Tanaka should be withdrawn and the claims be allowed.

Claims 45 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishi in view of Nishinaga as applied to claim 26, and further in view of U.S. Patent No. 6,353,219 to Kley (hereinafter "Kley"). The rejection is respectfully traversed.

Claims 45 and 46 depend from claim 26. As discussed above, the cited portions of Nishi '746 and Nishinaga fail to disclose or render obvious each and every claim element of claim 26.

Even assuming *arguendo* that the cited portions of Nishi '746, Nishinaga, and Kley are properly combinable (which Applicant does not concede), Applicant submits the cited portions of Kley fail to overcome the shortcomings of Nishi '746 and Nishinaga. The cited portions of Kley simply fail to disclose or render obvious a sensor, in operation, providing an output signal that is proportional to an amount of interaction of the beam of radiation with the region of gas and measuring, out of a path of the beam of radiation, the amount of interaction of the beam of radiation with the region of gas, as recited in claim 26.

Therefore, Applicant respectfully submits that a prima facie case of obviousness has not been established and that the cited portions of Nishi '746, Nishinaga, Kley, and combination thereof fail to disclose, teach, or suggest each and every element recited by claim 26. Claims 45 and 46 depend from claim 26 and are, therefore, patentable for at least the same reasons provided above related to claim 26, and for the additional features recited therein. Thus, Applicant respectfully requests that the rejection of claims 45 and 46 under 35 U.S.C. §103(a) over Nishi '746 and Nishinaga in view of Kley should be withdrawn and the claims be allowed.

Claims 1-7, 9-11, 13-17, 20-22, 24, 25, 50, 51 and 62 were rejected under 35 U.S.C. 103(a) as being unpatentable over Shiozawa in view of U.S. Patent No. 6,414,743 to Nishi et al. (hereinafter "Nishi '743"). The rejection is respectfully traversed.

Applicant respectfully submits that the cited portions of Shiozawa, Nishi '743, and a proper combination thereof, fail to disclose or render obvious a lithographic projection apparatus comprising, *inter alia*, a radiation absorber comprising a gas supply configured to supply an absorbent gas at a controlled concentration to at least one enclosure traversed by the beam of radiation, the absorbent gas serving to absorb radiation energy delivered by the beam of radiation to the substrate during exposure of the radiation-sensitive material to the patterned beam of radiation, wherein the absorbent gas comprises one of water (H<sub>2</sub>O); a hydrocarbon; or a mixture thereof, as recited in claim 1.



The cited portions of Shiozawa fail to disclose or teach a radiation absorber as recited in claim 1. Specifically, the cited portions of Shiozawa disclose an illuminator in which the oxygen concentration or wavelength of a source is changed to obtain a uniform illuminance distribution on a wafer. (*See* Abstract of Shiozawa). The cited portions of Shiozawa do not appear to disclose or teach that the supplied absorbent gas comprises water, a hydrocarbon, or a mixture thereof as recited in claim 1.

The Office Action states that Nishi '743 discloses that water and hydrocarbon absorb radiation and that it would allegedly be obvious to a person skilled in the art to provide water or hydrocarbon instead of oxygen in the system of Shiozawa to arrive at the claimed invention. Respectfully, Applicant disagrees. Applicant submits that the cited portions of Nishi '743 fail to overcome the shortcomings of Shiozawa.

First, the cited portions of Nishi '743 disclose filling the space of the projection system PL with an inert gas such as nitrogen or helium gas, with a reduced oxygen content. (*See, e.g.*, column 19, lines 37-43 of Nishi '743). Thus, the cited portions of Nishi '743 plainly fail to disclose or teach a radiation absorber comprising a gas supply configured to supply an absorbent gas, wherein the absorbent gas comprises one of water; a hydrocarbon; or a mixture thereof as recited in claim 1.

Further, the cited portions of Nishi '743 do not specifically state that the water and hydrocarbon in Nishi '743 absorb radiation. Rather, the cited portions of Nishi '743 merely state that a variation in transmittance is caused by the attachment of water molecules or hydrocarbon molecules to optical elements in the light path. Such variation in transmittance may not be due to absorbance. For example, those molecules may cause diffraction, refraction or reflection of light from the path and thus undesirably vary the transmittance.

Further, the cited portions of Nishi '743 clearly countenance against supply of water and/or hydrocarbon to the beam path and also countenance against provision of oxygen in the beam path as in Shiozawa. The cited portions of Nishi '743 disclose that a gas with no or highly reduced oxygen content is supplied to the space of the projection system PL. Thus, the cited portions of Nishi '743 clearly contradict and teach away from the cited portions of Shiozawa, which disclose oxygen in a space within an illuminator. The cited portions of Nishi '743 also state that water, hydrocarbon and other materials are removed from the radiation beam path by using a chemical filter or an electrostatic filter while the inert gas (having virtually no oxygen content) is supplied to the beam path. Thus, the cited portions of Nishi '743 clearly further teach away from the claimed invention by teaching that water or hydrocarbon should not be supplied to or in the beam path.

Moreover, there is no teaching or reasoned basis, based on evidence of record, provided in the Office Action regarding if and why water and/or hydrocarbon would be an “appropriate substitute” for the oxygen in the Shiozawa illuminator. As the cited portions of Nishi ‘743 note, water and hydrocarbon can become attached to an optical element and thus cause an undesired variation in transmittance. There is no indication in Nishi ‘743 (or obviously in Shiozawa) that water and/or hydrogen would or could provide the same effect as the oxygen in Shiozawa. For example, the oxygen in Shiozawa likely would not attach to an optical element and thus can be controlled to desirably vary transmittance; water and/or hydrogen likely could not be used to the same ends. Thus, Applicant submits that the Office Action has not properly established that water and/or hydrocarbon is an “appropriate substitute” for oxygen in Shiozawa. Rather, the cited portions of Nishi ‘743 teach the opposite – that water and/or hydrocarbon (and oxygen) in the beam path is undesirable.

Therefore, Applicant respectfully submits that a prima facie case of obviousness has not been established and that the cited portions of Shiozawa, Nishi ‘743, and a proper combination thereof fail to disclose or render obvious each and every element recited by claim 1. Claims 2-7, 9-11, 13-17, and 20-22 depend from claim 1, and, therefore, are patentable over Shiozawa, Nishi ‘743, and a proper combination thereof for at least the same reasons as provided above with respect to claim 1, and for the features recited therein. Claims 24, 25, 50, 51, and 62 are patentable over the cited portions of Shiozawa, Nishi ‘743, and a proper combination thereof, for at least similar reasons as provided above for claim 26, and for the features recited therein. Thus, Applicant respectfully requests that the rejection of claims 1-7, 9-11, 13-17, 20-22, 24, 25, 50, 51 and 62 under 35 U.S.C. §103(a) Shiozawa in view of Nishi ‘743 should be withdrawn and the claims be allowed.

#### **DOUBLE-PATENTING REJECTION**

Claims 1-7, 9, 13, 15-19, 21-26, 29, 31-34, 36, 39, 40-43, 47-55, and 62 were rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 2, and 5-23 of U.S. Patent No. 6,538,716. Claims 8, 14, 30 and 35 were rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 5, 7, and 19 of U.S. Patent No. 6,538,716 in view of Tanaka. Applicant traverses these rejections for at least similar reasons as provided in the Applicant’s previous responses, which are incorporated herein in their entirety by reference.

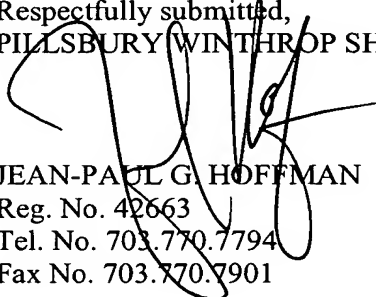
Nevertheless, as discussed in the Interview, Applicant would consider filing a terminal disclaimer when the obviousness-type double patenting rejections are the only

rejections remaining in the application so Applicant can properly determine whether a terminal disclaimer is merited. Thus, if the present claims are otherwise allowable, but for the obviousness-type double patenting rejections, the Examiner is kindly requested to contact the undersigned regarding filing a terminal disclaimer at that time.

All rejections have been addressed. It is respectfully submitted that the present application is in condition for allowance, and a notice to that effect is earnestly solicited. Should there be any questions or concerns regarding this application, the Examiner is invited to contact the undersigned at the below-listed telephone number.

Please charge any fees associated with the submission of this paper to Deposit Account Number 033975. The Commissioner for Patents is also authorized to credit any over payments to the above-referenced Deposit Account.

Respectfully submitted,  
PILLSBURY WINTHROP SHAW PITTMAN LLP



JEAN-PAUL G. HOFFMAN  
Reg. No. 42663  
Tel. No. 703.770.7794  
Fax No. 703.770.7901

**Date: February 25, 2008**  
JGH/JAS  
P.O. Box 10500  
McLean, VA 22102  
(703) 770-7900